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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/634,835	08/06/2003	Vladimir Vladimirovich Popov	BOE01 020	8621

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MARK C. COMTOIS  
Duane Morris LLP  
Suite 700  
1667 K Street, N.W.  
Washington, DC 20006

EXAMINER

MULLINS, BURTON S

ART UNIT PAPER NUMBER

2834

DATE MAILED: 09/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/634,835	<b>Applicant(s)</b> POPOV, VLADIMIR VLADIMIROVICH	
	<b>Examiner</b> Burton S. Mullins	<b>Art Unit</b> 2834	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 September 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement (IDS) submitted on 30 August 2004 has been considered by the examiner.

### ***Drawings***

2. The replacement drawings were received on 03 September 2004. These drawings are approved.

### ***Claim Rejections - 35 USC § 102***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1, 3, 5-10, 12, 14, 16-18 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by GB 1,503,708. GB '708 teaches a rotor for an electric machine comprising: a body 200 of generally cylindrical shape (Figs.1a-1b), said body having an inner opening 206 wherein a plurality of slots 201 are provided in the body, the said plurality of slots extending from the said inner opening towards the outer periphery of the said body; permanent magnets 203 disposed in said plurality of slots; wherein at least one of the said plurality of slots comprises an end section 201' near the outer periphery of the said body, the end section having an area of enlarged width (see. Figs.1a-1b).

Regarding claim 3, the magnets 203 terminate short of the end sections 201'.

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Regarding claim 5, the end sections 201' are filled with cast aluminum (p.3, lines 48-79).

Regarding claim 6, the laminated body 200 with magnets 203 together form a magnetic core.

Regarding claim 7 and 14, the slots and magnets generally extend radially.

Regarding claim 8, the inner opening 206 is for a shaft 204.

Regarding claims 9-10, the aluminum surrounding the rotor shaft 204 forms a non-magnetic "hub" between the core laminations 200 and the shaft 204.

Regarding claim 21, the magnets do not extend into sections 201'.

***Claim Rejections - 35 USC § 103***

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1-2, 4-8, 12-14 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al. (EP 641 059) in view of Tajima (US 6,445,100). Uchida teaches a rotor assembly for an electric machine comprising a body 10 of generally cylindrical shape (Fig.1B) having an inner opening (not numbered, see Fig.2A) wherein a plurality of slots (formed by sides 32; Fig.3A) are provided in the body, said plurality of slots extending from the inner opening towards the outer periphery of the body (Figs.1B&2A); permanent magnets 14 disposed in said plurality of slots; and at least one of said plurality of slots comprises an end section (in the area formed by connecting portions 74; Fig.8) near the outer periphery of the body.

Uchida does not teach that the end sections have “an area of enlarged width.”

Tajima, meanwhile, teaches a permanent magnet rotor including, a rotor body 30 of generally cylindrical shape and a plurality of slots 34' are provided in the body (Fig.9). Each slot has end sections or slits 62/64 with an area of enlarged width (c.7, lines 13-15). The enlarged end sections reduce leakage flux and prevent torque reduction (c.6, lines 5-9).

It would have been obvious to modify Uchida and provide slots end sections with an area of enlarged width per Tajima since this would have been desirable to reduce leakage flux and prevent torque reduction.

Regarding claim 2, certain intermediate rotor core laminations 76 in Uchida (Fig.9) have connecting portions 84 which close the slot end sections near the outer periphery of the rotor body.

Regarding claims 4 and 19-20, Uchida's and Tajima's magnets extend into the end section, i.e., they fill the entire radial dimension of the slot, partially extending into the end section without filling the entire end section or recesses.

Regarding claim 5, Tajima's enlarged end sections are filled with non-magnetic medium, e.g., air or adhesives.

Regarding claim 6, Uchida's and Tajima's rotor cores each comprise a magnetic core.

Regarding claims 7 and 14, the slots and magnets in Uchida and Tajima extend radially through the rotor body.

Regarding claim 8, the shaft 12 in Uchida is mounted co-axially with the rotor core, in the inner opening, by means of end plates 24 and rod members 22 (c.13, lines 13-27; Fig.20).

Regarding claim 13, the slits 62/64 forming the area of enlarged width at the end of each slot in Tajima comprise “recesses”.

Regarding method claims 16-19, since the combination of Uchida and Tajima teach all the structural limitations, the generic steps claimed in the method are inherent in the combination.

7. Claims 1-2, 5-14 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obara et al. (JP 2000-152534) in view of Tajima (US 6,445,100). Obara teaches a rotor assembly for an electric machine comprising a body 16 of generally cylindrical shape (Figs.1&3) having an inner opening (filled by hub 14 and shaft 15, Fig.1) wherein a plurality of slots 12 (with sides 12a/12b) are provided in the body, said plurality of slots extending from the inner opening towards the outer periphery of the body (Figs.1&3); permanent magnets 11 disposed in said plurality of slots; and at least one of said plurality of slots comprises an end section (bounded by bridges 16b; Fig.1) near the outer periphery of the body.

Obara does not teach that the end sections have “an area of enlarged width.”

Tajima, meanwhile, teaches a permanent magnet rotor including, a rotor body 30 of generally cylindrical shape and a plurality of slots 34' are provided in the body (Fig.9). Each slot has end sections or slits 62/64 with an area of enlarged width (c.7, lines 13-15). The enlarged end sections reduce leakage flux and prevent torque reduction (c.6, lines 5-9).

It would have been obvious to modify Obara and provide slots end sections with an area of enlarged width per Tajima since this would have been desirable to reduce leakage flux and prevent torque reduction.

Regarding claim 2, the bridges 16b in Obara close the outer periphery of the slots.

Regarding claim 5, Tajima's enlarged end sections are filled with non-magnetic medium, e.g., air or adhesives.

Regarding claim 6, Obara's and Tajima's rotor cores each comprise a magnetic core.

Regarding claims 7 and 14, the slots and magnets in Obara and Tajima extend radially through the rotor body.

Regarding claims 8-10, the shaft 15 in Obara is mounted co-axially with the rotor core, in the inner opening, by means of a non-magnetic hub 14 (Fig.1).

Regarding claim 11, Fig.1 of Obara teaches a convex shape between magnets.

Regarding claim 13, the slits 62/64 forming the area of enlarged width at the end of each slot in Tajima comprise "recesses".

Regarding method claims 16-20, since the combination of Obara and Tajima teach all the structural limitations, the generic steps claimed in the method are inherent in the combination. Further, the magnets in Tajima extend into the slits in that they do not fill up the slits entirely.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over GB '708 in view of Asano (JP 2001-52534). GB '708 does not teach an outer periphery of the rotor having a convex shape between two magnets.

Asano teaches a permanent magnet rotor including magnets 11 and core 16 formed so that the outer diameter is larger at the center of the poles and smaller at the boundaries between the poles (abstract). This reduces flux loss and distortion of induced voltage.

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It would have been obvious to modify GB '708 and provide an outer periphery of the rotor with a convex shape per Asano since this would have been desirable to reduce flux loss and distortion of induced voltage.

9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida and Tajima as applied to claim 1 above, further in view of Yamamoto et al. (EP 1-164684).

Neither Uchida nor Tajima teaches an outer periphery of the rotor having a concave shape between two magnets.

Yamamoto teaches a permanent magnet rotor including magnets 1 (Figs.1-2) disposed in core 3, wherein the outer periphery F of the rotor has concavities (generally denoted by 'end portions' c) formed thereon, between adjacent magnets 1, such that the rotor periphery forms a curve of a hyperbolic function to reduce motor inductance (abstract).

It would have been obvious to modify and provide an outer periphery of Uchida and Tajima's rotor with a concave shape per Yamamoto since this would have been desirable to reduce motor inductance.

### ***Response to Arguments***

10. Applicant's arguments filed 03 September 2004 have been fully considered but they are not wholly persuasive. Regarding applicant's arguments concerning GB '708, it is noted that applicant's own invention (claim 9) contemplates connection of the rotor body to the shaft by a hub, with the result that the magnets are "embedded" by the rotor core and the hub. Thus, the end products are the same, with the aluminum filled center-opening of GB '708 comprising the hub.



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*Conclusion*

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Burton S. Mullins whose telephone number is 571-272-2029. The examiner can normally be reached on Monday-Friday, 9 am to 5 pm. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Burton S. Mullins  
Primary Examiner  
Art Unit 2834

bsm  
23 September 2004